

Claims

1. An electroluminescent display of the type wherein a layer of electroluminescent material is sandwiched between but spaced from two electrode layers, and the electroluminescent material is composed of a plurality of separate areas each matching in shape and size the image which the relevant portion of the display is to show, each such area being surrounded by a layer of insulating material,
in which display the colour/reflectivity of one and/or other of the electroluminescent material and the surrounding insulator material is modified - or is apparently modified - so as to match that of the other.
2. An electroluminescent display as claimed in claim 1, wherein the colour/reflectivity of the insulator material is changed to match that of the phosphor.
3. An electroluminescent display as claimed in claim 2, wherein the insulator material is blended with inks or dyes to give a colour match to the unactivated state of the phosphor.
4. An electroluminescent display as claimed in claim 1, wherein the colour/reflectivity of the phosphor material is changed to match that of the insulator.
5. An electroluminescent display as claimed in claim 4, wherein the phosphor material is blended with inks or dyes to give a colour match to the insulator material.
6. An electroluminescent display as claimed in claim 1, wherein the colour/reflectivity of each of the

- 33 -

phosphor material and the insulating material is modified so as more closely to match each other.

7. An electroluminescent display as claimed in claim 6, wherein the phosphor material to be used is blended with a material of one suitable colour while the insulating material is also blended with a material of a suitable colour.
- 10 8. An electroluminescent display as claimed in claim 7, wherein the phosphor material and the insulator material are blended with a different intensity of the same colour.
- 15 9. An electroluminescent display as claimed in any preceding claim, wherein an additional layer of suitably-coloured material is formed between the substrate and the insulator layer so as effectively to mask the insulator layer from view and thus to present 20 the impression of a continuous layer when the combination is viewed through the transparent electrode.
- 25 10. An electroluminescent display as claimed in any preceding claim, wherein the display is provided with a front filter/absorber layer - an overlay - of transparent material so as appropriately to modify the manner in which external light entering the display 30 from the ambient surroundings is transmitted thereinto and then reflected back.
11. An electroluminescent display as claimed in claim 10, wherein the filter/absorber layer is a part of the substrate itself.

12. An electroluminescent display as claimed in claim 10, wherein the filter/absorber layer is an additional layer formed on the substrate.
- 5 13. An electroluminescent display as claimed in claim 12, wherein the filter/absorber layer is formed on the outside front surface of the substrate.
- 10 14. An electroluminescent display as claimed in any of claims 10-13, wherein the filter/absorber layer is positioned only at places in register with the individual images to be displayed.
- 15 15. An electroluminescent display as claimed in any of claims 10-13, wherein the filter is positioned to cover the entire surface of the display.
- 20 16. An electroluminescent display as claimed in any of claims 10-15, wherein the light reflected off the front of the display is very much greater than the light reflected off any of the internal interfaces.
- 25 17. An electroluminescent display as claimed in any of claims 10-16, wherein the light reflected from the substrate/phosphor interface should match in colour and hue the light reflected from the substrate/insulator interface.
- 30 18. An electroluminescent display as claimed in any of claims 10-17, wherein the reflectance spectrum of the filter is shifted in wavelength compared to the transmittance spectrum of the filter, so that the colour/hue of the emitted light from the phosphor is not the same as that of the reflected light from the very front surface of the display.
- 35

- 35 -

19. An electroluminescent display as claimed in any of claims 10-18, wherein the front filter/absorber layer is formed from a coloured transparent material.
- 5 20. An electroluminescent display as claimed in claim 19, wherein the colours are darker, the higher the intrinsic reflectivity of the component.
- 10 21. An electroluminescent display as claimed in claim 19, wherein the front filter has a transmission colour that matches the light emitted by the display's lightable areas when they are "on", and wherein the phosphor and the insulating/dielectric material are coloured to have the complementary colour to the 15 filter transmission colour.
- 20 22. An electroluminescent display as claimed in any of claims 10-18, wherein the front filter/absorber layer is a neutral density filter.
- 25 23. An electroluminescent display as claimed in claim 22, wherein the neutral-density filter has an absorption of from 75% to 85%.
- 30 24. An electroluminescent display as claimed in claim 23, wherein the neutral-density filter has an absorption of around 80%.
25. An electroluminescent display as claimed in any 30 of claims 10 to 18 or 22 to 24, wherein the front filter/absorber layer has a specularly-reflective front surface.
- 35 26. An electroluminescent display as claimed in claim 25, wherein the specularly-reflective filter/absorber layer is a multilayer "radian" colour film.

- 36 -

27. An electroluminescent display as claimed in claim 25, wherein the specularly-reflective filter/absorber layer is a highly scattering white layer and wherein the highly scattering element of the film is thin 5 compared to the spatial extent of the smallest element of the display and the highly scattering film scatters light essentially uniformly over the visible spectra.

28. An electroluminescent display as claimed in claim 10 25, 26 or 27, wherein the specularly-reflective overlay has a reflectance of from 75% to 85%.

29. An electroluminescent display as claimed in claim 15 28, wherein the specularly-reflective overlay has a reflectance of around 80%.

30. An electroluminescent display as claimed in any 20 of claims 22 to 29, wherein the transparent front electrode of the display is replaced with a thin somewhat transparent metallic electrode.

31. An electroluminescent display as claimed in any 25 of claims 22 to 30, wherein the front surface of the display has a very smooth finish to the front surface of the display.

32. A light-emitting display wherein the display includes a transmissive overlay that forms either a substantially-neutral-density filter or an outwardly-facing specularly-reflective surface, or both. 30

33. An electroluminescent display as claimed in claim 32, wherein the light-emitting display is a light-emitting diode (LED) display.

- 37 -

34. An electroluminescent display as claimed in claim 32, wherein the light-emitting display is a backlit liquid crystal display (an LCD).

5 35. An electroluminescent display as claimed in claim 32, wherein the light-emitting display is a thin film transistor (TFT) display.

.. 36. An electroluminescent display as claimed in claim 10 32, wherein the light-emitting display is an electroluminescent display.

15 37. A hand-holdable controller comprising an electroluminescent display as claimed in any of claims 1-36.

38. An electroluminescent display as claimed in any preceding claim wherein the electroluminescent material is a particulate phosphor.

20 39. An electroluminescent display as claimed in claim 38, wherein the particulate phosphor is zinc sulphide.

40. An electroluminescent display as claimed in claim 25 38 or 39, wherein the particulate phosphor is in the form of encapsulated particles.

30 41. An electroluminescent display as claimed in any preceding claim, wherein the plurality of separate areas of electroluminescent material are grouped into sets of related character-defining segments.

42. An electroluminescent display as claimed in claim 35 41, wherein the group of related segments is the standard seven segment group commonly employed in modern electrical and electronic displays.

- 38 -

43. An electroluminescent display as claimed in claim 41 or 42, wherein the groups are disposed in an array.